REMARKS

Status of the Claims

Claims 1 – 13 are pending. No claims have been withdrawn from consideration.

Claim Rejections

I. Claims 1 – 11 and 13 stand rejected under 35 U.S.C §102(b) over US 6,346,182 to Bradley (hereinafter, "Bradley").

Anticipation requires a single prior art reference to describe every aspect of the claimed subject matter.[1] Bradley does not describe every aspect of the claimed subject matter. The present rejection should, therefore, be withdrawn.

Claims 1, 6, and 13 relate to a method of fabricating a membrane-electrode assembly (MEA), particularly for PEM fuel cells. Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. The Office action does not address this aspect of the present invention. The abstract of Bradley states, the Bradley invention

> relates to a bipolar electrochemical process for toposelective electrodeposition of a catalytic substance on an electrically conductive particulate substrate to produce a catalyst, as well as to the catalyst so produced.

In other words, Bradley is directed to a catalyst and a method of producing the catalyst. Bradley is not concerned with a method of fabricating an MEA.

Claims 1, 6, and 13 further relate to a method of fabricating a membrane-electrode assembly (MEA), wherein the MEA comprises a polymer-electrolyte membrane (PEM). Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. On pages 3, 5, and 7, the Office

[1] See *Schering Corp. v. Geneva Pharms., Inc.*, 339 F.3d 1373, 1379 (Fed. Cir. 2003); *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1267-69 (Fed. Cir. 1991).

action errs by stating, cellulose paper sheets (28) are equivalent to a polymer-electrolyte membrane (PEM). Column 8, lines 30 – 35 of Bradley states,

> [p]referred electrically nonconductive materials used as inert support for the conductive particulate substrates include, by way of example and not limitation, commonly used supports for catalytic systems, such as alumina, silica or titania in the form of powders, or cellulose in the form of sheets.

At column 8, lines 7 – 12, Bradley also explains,

> [p]roper alignment with the electric field of the electrically conductive particulate substrate in the bipolar electrochemical cell may be more easily, uniformly or consistently accomplished if an optional, electrically nonconductive support (sometimes referred to herein as an 'inert' support) is used for the conductive substrate.

As discussed above, Bradley is not concerned with a method of fabricating an MEA. Bradley provides no apparent reason to assume that the cellulose sheets used as an inert support to provide proper alignment of the electrically conductive particulate substrate with the electric field in order to allow the formation of a catalyst would be useful as a PEM.

Claims 1, 6, and 13 further relate to a method comprising A) introducing ions of the at least one catalytic component into the polymer-electrolyte membrane and/or into an ionomer introduced into the reaction layers. Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. On pages 3, 5, and 7, the Office action errs by stating, column 14, lines 19 – 34 describe this aspect of the present invention. Column 6, lines 16 – 21 of Bradley states,

> [i]n the system of the present invention, the expected reduction process involves electrodeposition of a catalytic substance 22, schematically illustrated in FIG. 2 by the electrodeposition of catalytic substance 22 on the surface of particle 12 in the cathodic region 18 associated with electrochemical reduction.

At column 8, lines 7 – 12, Bradley also explains,

> [p]roper alignment with the electric field of the electrically conductive particulate substrate in the bipolar electrochemical cell may be more easily, uniformly or consistently accomplished if an optional, electrically nonconductive support (sometimes referred to herein as an 'inert' support) is used for the conductive substrate.

Bradley does not describe introducing ions of a catalytic component into a polymer-electrolyte membrane. To the contrary, Bradley describes introducing electrically conductive particulate substrate materials into an electrically nonconductive substrate and subsequently depositing a catalytic substance onto the surface of the electrically conductive particulate substrate. Applicants respectfully note, however, that column 7, lines 48 – 52 states,

> [t]he composition of the electrically conductive particulate substrate may be a conductive form of carbon, a metal, a metal alloy, a conductive metal oxide, a conductive polymer, a conductive organic salt crystal, a conductive semiconductor including a doped semiconductor, or mixtures thereof.

A conductive polymer is not necessarily an ionomer.

Claims 1, 6, and 13 further relate to a method comprising B) applying the electron conductor to both sides of the polymer-electrolyte membrane. Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. On pages 3, 5, and 7, the Office action errs by stating, column 14, lines 19 – 34 describe this aspect of the present invention. Column 14, lines 24 – 27 of Bradley states,

> [g]raphite particles 12 were dispersed onto one side of 60 um–thick cellulose paper sheets 28 by nebulizing an acetone suspension of the particles.

Bradley is not silent about this aspect of the present invention. To the contrary, Bradley explicitly states that the electron conductor is dispersed onto only one side of the cellulose paper. The Office action notes that the sheets (28) with the electron conductor

(12) dispersed on one side are stacked and sandwiched between two electrodes (14, 16). On this basis, the Office action asserts the electron conductor would be present on both sides of the membrane (28). Applicants respectfully submit, however, stacking and sandwiching sheets comprising an electron conductor is not equivalent to applying an electron conductor to both sides of a PEM.

Claims 1, 6, and 13 further relate to a method comprising C) electrochemically depositing the ions of the catalytic component from the polymer-electrolyte membrane and/or from the ionomer, introduced into the reaction layers, onto the electron conductor on at least one side of the polymer-electrolyte membrane. Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. On pages 3, 5, and 7, the Office action errs by stating, column 14, lines 35 – 57 describe this aspect of the present invention. Column 9, lines 16 – 21 of Bradley states,

> [t]he other component of the soluble salt containing the indicated metal ions is an anion component chosen to assure solubility of the desired salt in the environment in which it is used in this invention and to assure that the catalytic substance may be electrodeposited by bipolar electrochemistry onto the electrically conductive particulate substrate.

Furthermore, column 14, lines 35 – 57 explains that catalyst particles are electrodeposited onto the graphite particles. Bradley does not describe depositing ions of a catalytic component from the polymer-electrolyte membrane onto the electron conductor. To the contrary, Bradley describes electrodepositing from an environmental medium (liquid 26) to the electron conductor (graphite particles). Bradley does not describe depositing ions of a catalytic component from an ionomer introduced into a reaction layer of a PEM onto the electron conductor.

Claim 3 relates to a method wherein a variation of operating conditions is effected during the deposition under fuel cell conditions. Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. On page 4, the Office action errs by stating, column 14, lines 35 – 38 of Bradley discloses a variation of operating conditions, such as applying a voltage differential between

electrodes every fifteen minutes at different intensities during the deposition. Column 14, lines 50 – 54 of Bradley states,

> After the electric field has been applied for a sufficient time, 15 min. in the case of this Example, application of the potential difference between the electrodes was terminated by switching off the power supply 30, which removes the electric field.

Bradley does not describe any variation in the operating conditions during the deposition. The cited portion of Bradley describes conditions employed in separate examples of Bradley.

Claim 7 relates to a method as claimed in claim 1, wherein in step C) at least one of the elements Pt, Co, Fe, Cr, Mn, Cu, V, Ru, Pd, Ni, Mo, Sn, Zn, Au, Ag, Rh, Ir or W is deposited as the catalytic component on the cathode-side electron conductor. Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. On page 6, the Office action errs by stating, column 9, lines 4 – 15 describe this aspect of the present invention. Column 6, lines 16 – 21 of Bradley states,

> [i]n the system of the present invention, the expected reduction process involves electrodeposition of a catalytic substance 22, schematically illustrated in FIG. 2 by the electrodeposition of catalytic substance 22 on the surface of particle 12 in the cathodic region 18 associated with electrochemical reduction.

Assuming for the sake of argument that Bradley disclosed a fuel cell, Figure 2, shows that cathodic region 18 (i.e., the region where catalytic substance 22 is electrodeposited onto the surface of particle 12) would be on the anode side. Bradley does not describe depositing a catalytic component on the cathode-side electron conductor.

II. Claim 12 stands rejected under 35 U.S.C §103(a) over Bradley.

Applicants respectfully request reconsideration of whether all of the elements claimed in claim 12 were known in Bradley, whether one skilled in the art could have

combined the elements as claimed by known methods with no change in their respective functions, and whether the combination would have yielded nothing more than predictable results to one of ordinary skill in the art.

As expressed by the U.S. Supreme Court, "[t]he rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination yielded nothing more than predictable results to one of ordinary skill in the art."[2] Furthermore, "[t]he determination of obviousness is made with respect to the subject matter as a whole, not separate pieces of the claim."[3]

Claim 12 relates to a method as claimed in claim 1, wherein the catalytic component in step A) is introduced into the polymer-electrolyte membrane in an amount of from 0.000005 to 0.05 mmol/cm$^2$. Favorable reconsideration is respectfully requested, because Bradley does not describe this aspect of the claimed invention. On page 6 – 7, the Office action errs by stating, it would have been obvious to use catalyst component in an amount of 0.000005 to 0.05 mmol/cm$^2$ so as to allow electrodeposition to occur at a reasonably efficient rate but not so much that the conductivity will be too high to apply the electric field at the intensity or strength desired. Column 9, lines 31 – 37 of Bradley states,

> [p]referred sources of the catalytic substance are $PdCl_2$ or $AuBr_3$ in a concentration of about 0.05 mM to about 10 mM. The concentration of the salt in the environment should be enough to allow electrodeposition at a reasonably efficient rate, but the concentration should not be so much that the conductivity will be too high to apply the electric field at the intensity or strength desired

The Office action does not actually address the claim requirements. The claim describes an amount of the catalytic component introduced into the polymer-electrolyte membrane.

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[2] MPEP §2143, citing *KSR*, 550 U.S. at ___, 82 USPQ2d at 1395; *Sakraida v. AG Pro, Inc.*, 425 U.S. 273, 282, 189 USPQ 449, 453 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 62-63, 163 USPQ 673, 675 (1969); *Great Atlantic & P. Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 87 USPQ 303, 306 (1950) (emphasis added).

[3] *Sanofi-Synthelabo, Inc. v. Apotex, Inc.* Fed. Cir. 2007-1438 (2008), citing KSR Int'l Co. v. Teleflex, Inc. 127 S.Ct. 1727, 1734 (2007); and *Kimberly-Clark Corp. v. Johnson & Johnson*, 745 F.2d 1437, 1448 (Fed. Cir. 1984).

The cited portion of Bradley describes the concentration of the salt in the environment (i.e. the liquid 26). Bradley provides no describtion that would anticipate or obviate the claim 12.

Petition for Extension of Time

Applicants respectfully request that a one–month extension of time be granted in this case. The respective $130.00 fee is paid by credit card.

Fee Authorization

Please charge any shortage in fees due in connection with the filing of this paper, including any shortage in Extension of Time fees, to Deposit Account 14.1437. Please credit any excess fees to such account.

Conclusion

The present application is in condition for allowance, and applicants respectfully request favorable action. In order to facilitate the resolution of any questions, the Examiner is welcome to contact the undersigned by phone.

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